SEQUENCE LISTING

<110> Agriculture Victoria Services Pty Ltd
AgResearch Limited

<120> Chalcone synthase dihydroflavonol 4-reductase and leucoanthocynanidine reductase from clover, medic ryegrass or fescue

<130> M80937719:DLT:cl

<140> US 10/552,857
<141> 2005-10-14

<150> 2003901797
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<160> 77

<170> PatentIn version 3.3

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caaccaaagt caaagattac tcacttaatc ttttgcacca caagtggtgt tgacatgcct 540

ggtgctgatt accaactcac aaaactctta ggtcttcgcc catatgtgaa aaggtatatg 600

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Gln Ser Thr Tyr Pro Asp Phe Tyr Phe Lys Ile Thr Asn Ser Glu His
35 40 45

Lys Thr Glu Leu Lys Glu Lys Phe Gln Arg Met Cys Asp Lys Ser Met
50 55 60

Ile Lys Ser Arg Tyr Met Tyr Leu Thr Glu Glu Ile Leu Lys Glu Asn
65 70 75 80

Pro Ser Leu Cys Glu Tyr Met Ala Pro Ser Leu Asp Ala Arg Gln Asp
85 90 95

Met Val Val Val Glu Val Pro Arg Leu Gly Lys Glu Ala Ala Val Lys
100 105 110

Ala Ile Lys Glu Trp Gly Gln Pro Lys Ser Lys Ile Thr His Leu Ile
115 120 125

Phe Cys Thr Thr Ser Gly Val Asp Met Pro Gly Ala Asp Tyr Gln Leu
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Thr Lys Leu Leu Gly Leu Arg Pro Tyr Val Lys Arg Tyr Met Met Tyr
145 150 155 160

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Gln Gln Gly Cys Phe Ala Gly Gly Thr Val Leu Arg Leu Ala Lys Asp
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            180                 185                 190

Val Thr Ala Val Thr Phe Arg Gly Pro Ser Asp Thr His Leu Asp Ser
        195                 200                 205

Leu Val Gly Gln Ala Leu Phe Gly Asp Gly Ala Ala Ala Leu Ile Val
    210                 215                 220

Gly Ser Asp Pro Val Pro Glu Ile Glu Lys Pro Ile Phe Glu Met Val
225                 230                 235                 240

Trp Thr Ala Gln Thr Ile Ala Pro Asp Ser Glu Gly Ala Ile Asp Gly
                245                 250                 255

His Leu Arg Glu Ala Gly Leu Thr Phe His Leu Leu Lys Asp Val Pro
            260                 265                 270

Gly Ile Val Ser Lys Asn Ile Asn Lys Ala Leu Val Glu Ala Phe Gln
        275                 280                 285

Pro Leu Gly Ile Ser Asp Tyr Asn Ser Ile Phe Trp Ile Ala His Pro
    290                 295                 300

Gly Gly Pro Ala Ile Leu Asp Gln Val Glu Gln Lys Leu Ala Leu Lys
305                 310                 315                 320

Pro Glu Lys Met Arg Ala Thr Arg Glu Val Leu Ser Glu Tyr Gly Asn
                325                 330                 335

Met Ser Ser Ala Cys Val Leu Phe Ile Leu Asp Glu Met Arg Lys Lys
            340                 345                 350

Ser Ala Gln Asn Gly Leu Lys Thr Thr Gly Glu Gly Leu Asp Trp Gly
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<213> Trifolium repens

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20 25 30

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35 40 45

Asp Asn Pro Glu Leu Lys Gln Lys Leu Ala Arg Leu Cys Lys Thr Thr
50 55 60

Thr Val Lys Thr Arg Tyr Val Val Met Asn Glu Glu Ile Leu Lys Lys
65 70 75 80

Tyr Pro Glu Leu Val Val Glu Gly Ala Ser Thr Val Lys Gln Arg Leu
85 90 95

Glu Ile Cys Asn Glu Ala Val Thr Gln Met Ala Ile Glu Ala Ser Gln
100 105 110

Val Cys Leu Lys Asn Trp Gly Arg Ser Leu Ser Asp Ile Thr His Val
115 120 125

Val Tyr Val Ser Ser Ser Glu Ala Arg Leu Pro Gly Gly Asp Leu Tyr

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Tyr Phe Ser Gly Cys Ser Gly Gly Val Ala Gly Leu Arg Val Ala Lys
                165                 170                 175

Asp Val Ala Glu Asn Asn Pro Gly Ser Arg Val Leu Leu Ala Thr Ser
            180                 185                 190

Glu Thr Thr Ile Ile Gly Phe Lys Pro Pro Ser Val Asp Arg Pro Tyr
        195                 200                 205

Asp Leu Val Gly Val Ala Leu Phe Gly Asp Gly Ala Gly Ala Met Ile
    210                 215                 220

Ile Gly Ser Asp Pro Val Phe Glu Thr Glu Thr Pro Leu Phe Glu Leu
225                 230                 235                 240

His Thr Ser Ala Gln Glu Phe Ile Pro Asp Thr Glu Lys Lys Ile Asp
                245                 250                 255

Gly Arg Leu Thr Glu Glu Gly Ile Ser Phe Thr Leu Ala Arg Glu Leu
            260                 265                 270

Pro Gln Ile Ile Glu Asp Asn Val Glu Gly Phe Cys Asn Lys Leu Ile
        275                 280                 285

Asp Val Val Gly Leu Glu Asn Lys Glu Tyr Asn Lys Leu Phe Trp Ala
    290                 295                 300

Val His Pro Gly Gly Pro Ala Ile Leu Asn Arg Val Glu Lys Arg Leu
305                 310                 315                 320

Glu Leu Ser Pro Gln Lys Leu Asn Ala Ser Arg Lys Ala Leu Met Asp
                325                 330                 335

Tyr Gly Asn Ala Ser Ser Asn Thr Ile Val Tyr Val Leu Glu Tyr Met
            340                 345                 350

Leu Glu Glu Glu Lys Lys Ile Lys Lys Ala Gly Gly Gly Asp Ser Glu
        355                 360                 365

Trp Gly Leu Ile Leu Ala Phe Gly Pro Gly Ile Thr Phe Glu Gly Ile
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aaggcaacga tacttgcatt aggaaaggct ttccccgccc aggtcctccc tcaagagtgc 240

ttggtggaag gattcattcg cgacactaag tgtgacgata cttatattaa ggagaaattg 300

gagcgtcttt gcaaaaacac aactgtgaaa acaagataca cagtaatgtc aaaggagatc 360

ttagacaact atccagagct agccatagat ggaacaccaa caataaggca aaagcttgaa 420

atagcaaatc cagcagtagt tgaaatggca acaagagcaa gcaaagattg catcaaagaa 480

tggggaaggt cacctcaaga tatcacacac atagtctatg tttcctcgag cgaaattcgt 540

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gatggcgccg ctgctgcaat aattggaaca gaccctatat tgaatcaaga atcacctttc 840

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agaatcactg aagagggtat taattttaag cttggaagag accttcctca aaaaattgaa 960

gacaatattg aagaattttg caagaaaatt atggctaaaa gtgatgttaa ggaatttaat 1020

gacttatttt gggctgttca tcctggtggg ccagctatac tcaataagct agaaaatata 1080

ctcaaattga aaagtgataa attggattgt agtaggaagg cattaatgga ttatggaaat 1140

gttagtagca atactatatt ctatgtgatg gagtatatga gagattattt gaaggaagat 1200

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aattgttcta tgatatcttc attgttgata ctgtaataat ataatatcta atttggctgg 1560

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<213> Trifolium repens

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20 25 30

Lys Ala Phe Pro Ala Gln Val Leu Pro Gln Glu Cys Leu Val Glu Gly
35 40 45

Phe Ile Arg Asp Thr Lys Cys Asp Asp Thr Tyr Ile Lys Glu Lys Leu
50 55 60

Glu Arg Leu Cys Lys Asn Thr Thr Val Lys Thr Arg Tyr Thr Val Met
65 70 75 80

Ser Lys Glu Ile Leu Asp Asn Tyr Pro Glu Leu Ala Ile Asp Gly Thr
85 90 95

Pro Thr Ile Arg Gln Lys Leu Glu Ile Ala Asn Pro Ala Val Val Glu
100 105 110

Met Ala Thr Arg Ala Ser Lys Asp Cys Ile Lys Glu Trp Gly Arg Ser
115 120 125

Pro Gln Asp Ile Thr His Ile Val Tyr Val Ser Ser Ser Glu Ile Arg
130 135 140

Leu Pro Gly Gly Asp Leu Tyr Leu Ala Asn Glu Leu Gly Leu Asn Ser
145 150 155 160

Asp Val Asn Arg Val Met Leu Tyr Phe Leu Gly Cys Tyr Gly Gly Val
165 170 175

Thr Gly Leu Arg Val Ala Lys Asp Ile Ala Glu Asn Asn Pro Gly Ser
180 185 190

Arg Val Leu Leu Thr Thr Ser Glu Thr Thr Ile Leu Gly Phe Arg Pro
195 200 205

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Pro Ser Lys Ala Arg Pro Tyr Asp Leu Val Gly Ala Ala Leu Phe Gly
    210                 215                 220

Asp Gly Ala Ala Ala Ala Ile Ile Gly Thr Asp Pro Ile Leu Asn Gln
225                 230                 235                 240

Glu Ser Pro Phe Met Glu Leu Asn His Ala Val Gln Lys Phe Leu Pro
                245                 250                 255

Asp Thr Gln Asn Val Ile Asp Gly Arg Ile Thr Glu Glu Gly Ile Asn
            260                 265                 270

Phe Lys Leu Gly Arg Asp Leu Pro Gln Lys Ile Glu Asp Asn Ile Glu
        275                 280                 285

Glu Phe Cys Lys Lys Ile Met Ala Lys Ser Asp Val Lys Glu Phe Asn
    290                 295                 300

Asp Leu Phe Trp Ala Val His Pro Gly Gly Pro Ala Ile Leu Asn Lys
305                 310                 315                 320

Leu Glu Asn Ile Leu Lys Leu Lys Ser Asp Lys Leu Asp Cys Ser Arg
                325                 330                 335

Lys Ala Leu Met Asp Tyr Gly Asn Val Ser Ser Asn Thr Ile Phe Tyr
            340                 345                 350

Val Met Glu Tyr Met Arg Asp Tyr Leu Lys Glu Asp Gly Ser Glu Glu
        355                 360                 365

Trp Gly Leu Gly Leu Ala Phe Gly Pro Gly Ile Thr Phe Glu Gly Val
    370                 375                 380

Leu Leu Arg Ser Leu
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taacgcccaa cgttcaaatg gccctgccac tatcttagct tttggcacag ccactccttc    240

taactgtgtc actcaagctg attatcctga ttactacttt cgtatcacca acagcgaaca    300
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accatcacta gatgtaagac gagacatagt ggttgttgaa gtaccaaagc taggtaaaga 480

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<212> PRT
<213> Trifolium repens

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Ala Thr Ile Leu Ala Phe Gly Thr Ala Thr Pro Ser Asn Cys Val Thr
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Gln Ala Asp Tyr Pro Asp Tyr Tyr Phe Arg Ile Thr Asn Ser Glu His
35 40 45

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Met Thr Asp Leu Lys Glu Lys Phe Lys Arg Met Cys Asp Arg Ser Met
    50                  55                  60

Ile Lys Lys Arg Tyr Met His Leu Thr Glu Asp Phe Leu Lys Glu Asn
65                  70                  75                  80

Pro Asn Met Cys Glu Tyr Met Ala Pro Ser Leu Asp Val Arg Arg Asp
                85                  90                  95

Ile Val Val Val Glu Val Pro Lys Leu Gly Lys Glu Ala Ala Lys Lys
            100                 105                 110

Ala Ile Cys Glu Trp Gly Gln Pro Lys Ser Lys Ile Thr His Leu Val
        115                 120                 125

Phe Cys Thr Thr Ser Gly Val Asp Met Pro Gly Ala Asp Tyr Gln Leu
    130                 135                 140

Thr Lys Leu Leu Gly Leu Lys Pro Ser Val Lys Arg Leu Met Met Tyr
145                 150                 155                 160

Gln Gln Gly Cys Phe Ala Gly Gly Thr Val Leu Arg Leu Ala Lys Asp
                165                 170                 175

Leu Val Glu Asn Asn Lys Asn Ala Arg Val Leu Val Val Cys Ser Glu
            180                 185                 190

Ile Thr Ala Val Thr Phe Arg Gly Pro Ser Asp Thr His Leu Asp Ser
        195                 200                 205

Leu Val Gly Gln Ala Leu Phe Gly Asp Gly Ala Ala Ala Met Ile Ile
    210                 215                 220

Gly Ala Asp Pro Asp Leu Thr Val Glu Arg Pro Ile Phe Glu Ile Val
225                 230                 235                 240

Ser Ala Ala Gln Thr Ile Leu Pro Asp Ser Asp Gly Ala Ile Asp Gly
                245                 250                 255

His Leu Arg Glu Val Gly Leu Thr Phe His Leu Leu Lys Asp Val Pro
            260                 265                 270

Gly Ile Ile Ser Lys Asn Ile Glu Lys Ser Leu Val Glu Ala Phe Ala
        275                 280                 285

Pro Ile Gly Ile Asn Asp Trp Asn Ser Ile Phe Trp Val Ala His Pro
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Gly Gly Pro Ala Ile Leu Asp Gln Val Glu Glu Lys Leu His Leu Lys
305 310 315 320

Glu Glu Lys Leu Arg Ser Thr Arg His Val Leu Ser Glu Tyr Gly Asn
325 330 335

Met Ser Ser Ala Cys Val Leu Phe Ile Leu Asp Glu Met Arg Lys Arg
340 345 350

Ser Lys Glu Glu Gly Met Ile Thr Thr Gly Glu Gly Leu Glu Trp Gly
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Val Leu Phe Gly Phe Gly Pro Gly Leu Thr Val Glu Thr Val Val Leu
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His Ser Val Pro Val Gln Gly
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tcgagtattt taagactaag ggggcactga agaattagat tttgatattt ctaattcaat 1140

agcaaactct aagcttgtta tgtgtttgtg aagttcagag tgaaatatca aatgaataag 1200

tggagagagc acaataagag gagagcacaa taattttgga aaaaaaaaaa aaaaaaaaaa 1260

aaaaaaaagt actctgcgtt gttaccactg cttaatcact agtgaattc 1309

<210> 10
<211> 338
<212> PRT
<213> Trifolium repens

<400> 10

Met Ala Ser Ile Lys Gln Ile Gly Asn Lys Lys Ala Cys Val Ile Gly
1 5 10 15

Gly Thr Gly Phe Val Ala Ser Met Leu Ile Lys Gln Leu Leu Glu Lys
20 25 30

Gly Tyr Ala Val Asn Thr Thr Val Arg Asp Pro Asp Ser Pro Lys Lys
35 40 45

Ile Ser His Leu Val Ala Leu Gln Ser Leu Gly Glu Leu Asn Leu Phe
50 55 60

Arg Ala Asp Leu Thr Val Glu Glu Asp Phe Asp Ala Pro Ile Ala Gly
65 70 75 80

Cys Glu Leu Val Phe Gln Leu Ala Thr Pro Val Asn Phe Ala Ser Gln
85 90 95

Asp Pro Glu Asn Asp Met Ile Lys Pro Ala Ile Lys Gly Val Leu Asn
100 105 110

Val Leu Lys Ala Ile Ala Arg Ala Lys Glu Val Lys Arg Val Ile Leu
115 120 125

Thr Ser Ser Ala Ala Ala Val Thr Ile Asn Glu Leu Lys Gly Thr Gly
130 135 140

His Val Met Asp Glu Thr Asn Trp Ser Asp Val Glu Phe Leu Asn Thr
145 150 155 160

Ala Lys Pro Pro Thr Trp Gly Tyr Pro Ala Ser Lys Met Leu Ala Glu

165 170 175

Lys Ala Ala Trp Lys Phe Ala Glu Glu Asn Asp Ile Asp Leu Ile Thr
180 185 190

Val Ile Pro Ser Leu Thr Thr Gly Pro Ser Leu Thr Pro Asp Ile Pro
195 200 205

Ser Ser Val Gly Leu Ala Met Ser Leu Ile Thr Gly Asn Asp Phe Leu
210 215 220

Ile Asn Ala Leu Lys Gly Met Gln Phe Leu Ser Gly Ser Leu Ser Ile
225 230 235 240

Thr His Val Glu Asp Ile Cys Arg Ala His Ile Phe Leu Ala Glu Lys
245 250 255

Glu Ser Ala Ser Gly Arg Tyr Ile Cys Cys Ala His Asn Thr Ser Val
260 265 270

Pro Glu Leu Ala Lys Phe Leu Asn Lys Arg Tyr Pro Gln Tyr Lys Val
275 280 285

Pro Thr Glu Phe Asp Asp Cys Pro Ser Lys Ala Lys Leu Ile Ile Ser
290 295 300

Ser Glu Lys Leu Ile Lys Glu Gly Phe Ser Phe Lys His Gly Ile Ala
305 310 315 320

Glu Thr Phe Asp Gln Thr Val Glu Tyr Phe Lys Thr Lys Gly Ala Leu
325 330 335

Lys Asn

<210> 11
<211> 1409
<212> *DNA*
<213> Trifolium repens

<400> 11
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taactctaaa agcaaagcaa tggcaccagc agcaacatca tcaccaacca ctcctactac 120

taccaagggt cgtgtcctaa ttgttggagg aacaggtttc attggaaaat ttgtaactga 180

ggcaagtctt tccacaacac acccaaccta cttgttggtt cggccaggac ctcttctctc 240

ttctaaggct gccactatta aggcattcca agagaaaggt gccattgtca tttatggtcg 300

ggtaaataat aaggagttca tggagatgat tttgaaaaag tatgagataa atgtagtcat 360

ttctgcaata ggaggctctg atggcttgct ggaacagctt actttggtgg aggccatgaa 420

atctattaac accattaaga ggtttttgcc ttcggaattt ggtcacgatg tggacagagc 480

aaatcctgtg gaacctggcc taacaatgta caaacagaaa cgtttggtta gacgtgtgat 540

cgaagaatct ggtataccat acacctacat ctgttgcaat tcgatcgcat cttggccgta 600

ctatgacaat tgtcatccat cacagcttcc tccaccgttg gatcaattac atatttatgg 660

tcatggcgat gtcaaagctt actttgttga tggctatgat attgggaaat tcacaatgaa 720

ggtcattgat gatgaaagaa caatcaacaa aaatgttcat tttcgacctt ctaacaattg 780

ttatagcatg aatgagcttg cttctttgtg ggaaaacaaa attgcacgaa aaattcctag 840

agtgatcgtc tctgaagacg atcttctagc aatagccgca gaaaattgca taccggaaag 900

tgtcgtggca ccaatcactc atgatatatt catcaatgga tgtcaagtta acttcaagat 960

agatggaatt catgatgttg aaattggcac tctatatcct ggtgaatcgg taagaagttt 1020

ggaggaatgc tatgagaaat ttgttgtcat ggcggctgac aagattcata aagaagaaac 1080

tggagttacc gcaggtgggg gcggcacaac ggctatggta gagccggtgc caatcacagc 1140

ttcctgttga aaaggttcac ctgaggtgga tattcttttg agtcataaga catgttgatt 1200

gttgatgttg ttttcaagaa tgtttcatca tttcatgtgt tttattaatc ctaagtacaa 1260

ataattgctg tctacgtacg ttcttagttg caaaaattct tgttattctc tattgaggta 1320

aaagtcttca tgtttacaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaagt actctgcgtt 1380

gttaccactg cttaatcact agtgaattc 1409

<210> 12
<211> 356
<212> PRT
<213> Trifolium repens

<400> 12

Met Ala Pro Ala Ala Thr Ser Ser Pro Thr Thr Pro Thr Thr Thr Lys
1 5 10 15

Gly Arg Val Leu Ile Val Gly Gly Thr Gly Phe Ile Gly Lys Phe Val
20 25 30

Thr Glu Ala Ser Leu Ser Thr Thr His Pro Thr Tyr Leu Leu Val Arg
35 40 45

Pro Gly Pro Leu Leu Ser Ser Lys Ala Ala Thr Ile Lys Ala Phe Gln
50 55 60

Glu Lys Gly Ala Ile Val Ile Tyr Gly Arg Val Asn Asn Lys Glu Phe

65 70 75 80

Met Glu Met Ile Leu Lys Lys Tyr Glu Ile Asn Val Val Ile Ser Ala
85 90 95

Ile Gly Gly Ser Asp Gly Leu Leu Glu Gln Leu Thr Leu Val Glu Ala
100 105 110

Met Lys Ser Ile Asn Thr Ile Lys Arg Phe Leu Pro Ser Glu Phe Gly
115 120 125

His Asp Val Asp Arg Ala Asn Pro Val Glu Pro Gly Leu Thr Met Tyr
130 135 140

Lys Gln Lys Arg Leu Val Arg Arg Val Ile Glu Glu Ser Gly Ile Pro
145 150 155 160

Tyr Thr Tyr Ile Cys Cys Asn Ser Ile Ala Ser Trp Pro Tyr Tyr Asp
165 170 175

Asn Cys His Pro Ser Gln Leu Pro Pro Pro Leu Asp Gln Leu His Ile
180 185 190

Tyr Gly His Gly Asp Val Lys Ala Tyr Phe Val Asp Gly Tyr Asp Ile
195 200 205

Gly Lys Phe Thr Met Lys Val Ile Asp Asp Glu Arg Thr Ile Asn Lys
210 215 220

Asn Val His Phe Arg Pro Ser Asn Asn Cys Tyr Ser Met Asn Glu Leu
225 230 235 240

Ala Ser Leu Trp Glu Asn Lys Ile Ala Arg Lys Ile Pro Arg Val Ile
245 250 255

Val Ser Glu Asp Asp Leu Leu Ala Ile Ala Ala Glu Asn Cys Ile Pro
260 265 270

Glu Ser Val Val Ala Pro Ile Thr His Asp Ile Phe Ile Asn Gly Cys
275 280 285

Gln Val Asn Phe Lys Ile Asp Gly Ile His Asp Val Glu Ile Gly Thr
290 295 300

Leu Tyr Pro Gly Glu Ser Val Arg Ser Leu Glu Glu Cys Tyr Glu Lys
305 310 315 320

Phe Val Val Met Ala Ala Asp Lys Ile His Lys Glu Glu Thr Gly Val
325 330 335

Thr Ala Gly Gly Gly Gly Thr Thr Ala Met Val Glu Pro Val Pro Ile
340 345 350

Thr Ala Ser Cys
355

<210> 13
<211> 1551
<212> DNA
<213> Trifolium repens

<400> 13
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accaacattg tcacaattaa ctctaaaagc aaagcaatgg caccagcagc aacatcatca 120

ccaaccactc ctactactac caagggtcgt gtcctaattg ttggaggaac aggtttcatt 180

ggaaaatttg taactgaggc aagtctttcc acaacacacc caacctactt gttggttcgg 240

ccaggacctc ttctctcttc taaggctgcc actattaagg cattccaaga gaaaggtgcc 300

attgtcattt atggtcgggt aaataataag gagttcatgg agatgatttt gaaaaagtat 360

gagataaatg tagtcatttc tgcaatagga ggctctgatg gcttgctgga acagcttact 420

ttggtggagg ccatgaaatc tattaacacc attaagaggt ttttgccttc agaatttggt 480

cacgatgtgg acagagcaaa tcctgtggaa cctggcctaa caatgtacaa acagaaacgt 540

ttggttagac gtgtgatcga agaatctggt gtaccataca cctacatctg ttgcaattcg 600

atcgcatcct ggccgtacta tgacaattgt catccatcac agcttcctcc accgttggat 660

caattacata tttatggtca tggcgatgtc aaagcttact ttgttgatgg ctatgatatt 720

gggaaattca caatgaaggt cattgatgat gaaagaacaa tcaacaaaaa tgttcatttt 780

cgaccttcta acaattgtta tagcatgaat gagcttgctt ctttgtggga aaacaaaatt 840

gcacgaaaaa ttcctagagt gatcgtctct gaagacgatc ttctagcaat agccgcagaa 900

aactgcatac cggaaagtgt tgtggcatca atcactcatg atatattcat caatggatgt 960

caagttaact tcaaggtaga tggaattcat gatgttgaaa ttggcactct atatcctggt 1020

gaatcggtaa gaagtttgga ggaatgctat gagaaatttg ttgtcatggc ggctgacaag 1080

attcataaag aagaaactgg agttaccgca ggtgggggcg gcacaacggc tatggtagag 1140

ccggtgccaa tcacagcttc ctgttgaaaa ggttcacctg aggtggatat tcttttgagt 1200

cataagacat gttgattgtt gatgttgttt tcaagaatgt ttcatcattt catgtgtttt 1260

attaatccta agtacaaata attgctgtct acgtacgttc ttagttgcga aaattcttgt 1320

tattctctat tggggtaaaa gtcttcatgt ttattgtagt tgtgttggtt tttcatatat 1380

gctatttgca ataatgattt ttgtgaagca cttgtggtgt atttacttac tactgaaaat 1440

aatggttaca caaaatatat aaaaaaataa aaataagcaa aaaaaaaaaa aaaaaaaaaa 1500

aaaaaaaaaa gtactctgcg ttgttaccac tgcttaatca ctagtgaatt c 1551

<210> 14
<211> 356
<212> PRT
<213> Trifolium repens

<400> 14

Met Ala Pro Ala Ala Thr Ser Ser Pro Thr Thr Pro Thr Thr Thr Lys
1 5 10 15

Gly Arg Val Leu Ile Val Gly Gly Thr Gly Phe Ile Gly Lys Phe Val
20 25 30

Thr Glu Ala Ser Leu Ser Thr Thr His Pro Thr Tyr Leu Leu Val Arg
35 40 45

Pro Gly Pro Leu Leu Ser Ser Lys Ala Ala Thr Ile Lys Ala Phe Gln
50 55 60

Glu Lys Gly Ala Ile Val Ile Tyr Gly Arg Val Asn Asn Lys Glu Phe
65 70 75 80

Met Glu Met Ile Leu Lys Lys Tyr Glu Ile Asn Val Val Ile Ser Ala
85 90 95

Ile Gly Gly Ser Asp Gly Leu Leu Glu Gln Leu Thr Leu Val Glu Ala
100 105 110

Met Lys Ser Ile Asn Thr Ile Lys Arg Phe Leu Pro Ser Glu Phe Gly
115 120 125

His Asp Val Asp Arg Ala Asn Pro Val Glu Pro Gly Leu Thr Met Tyr
130 135 140

Lys Gln Lys Arg Leu Val Arg Arg Val Ile Glu Glu Ser Gly Val Pro
145 150 155 160

Tyr Thr Tyr Ile Cys Cys Asn Ser Ile Ala Ser Trp Pro Tyr Tyr Asp
165 170 175

Asn Cys His Pro Ser Gln Leu Pro Pro Pro Leu Asp Gln Leu His Ile
180 185 190

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Tyr Gly His Gly Asp Val Lys Ala Tyr Phe Val Asp Gly Tyr Asp Ile
        195                 200                 205

Gly Lys Phe Thr Met Lys Val Ile Asp Asp Glu Arg Thr Ile Asn Lys
    210                 215                 220

Asn Val His Phe Arg Pro Ser Asn Asn Cys Tyr Ser Met Asn Glu Leu
225                 230                 235                 240

Ala Ser Leu Trp Glu Asn Lys Ile Ala Arg Lys Ile Pro Arg Val Ile
                245                 250                 255

Val Ser Glu Asp Asp Leu Leu Ala Ile Ala Ala Glu Asn Cys Ile Pro
            260                 265                 270

Glu Ser Val Val Ala Ser Ile Thr His Asp Ile Phe Ile Asn Gly Cys
        275                 280                 285

Gln Val Asn Phe Lys Val Asp Gly Ile His Asp Val Glu Ile Gly Thr
    290                 295                 300

Leu Tyr Pro Gly Glu Ser Val Arg Ser Leu Glu Glu Cys Tyr Glu Lys
305                 310                 315                 320

Phe Val Val Met Ala Ala Asp Lys Ile His Lys Glu Glu Thr Gly Val
                325                 330                 335

Thr Ala Gly Gly Gly Gly Thr Thr Ala Met Val Glu Pro Val Pro Ile
            340                 345                 350

Thr Ala Ser Cys
        355
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<210> 15
<211> 1384
<212> DNA
<213> Trifolium repens

<400> 15

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taactctaaa agtaaagcaa tggcaccagc agcaacatca tcaccaacca ctcccactac    120

taccaagggt cgtgtcctaa ttgttggagg aacaggtttc attggaaaat ttgtaactga    180

ggcaagtctt tccacaacac acccaaccta cttgttggtt cggccaggac ctcttctctc    240

ttctaaggct gccactatta aggcattcca agagaaaggt gccattgtca tttatggtcg    300

ggtaaataat aaggagttca tggagatgat tttgaaaaag tatgagataa atgtagtcat    360

ttctgcaata ggaggctctg atggcttgct ggaacagctt actttggtgg aggccatgaa    420
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atctattaac accattaaga ggtttttgcc ttcggaattt ggtcacgatg tggacagagc 480

agatcctgtg gaacctggcc taacaatgta caaacagaaa cgtttggtta gacgtgtgat 540

cgaagaatct ggtataccat acacctacat ctgttgcaat tcgatcgcat cttggccgta 600

ctatgacaat tgtcatccat cacagcttcc tccaccgttg gatcaattac atatttatgg 660

tcatggcgat gtcaaagctt actttgttga tggctatgat attgggaaat tcacaatgaa 720

ggtcattgat gatgaaagaa caatcaacaa aaatgttcat tttcgacctt ctaacaattg 780

ttatagcatg aatgagcttg cttctttgtg ggaaaacaaa attgcacgaa aaattcctag 840

agtgatcgtc tctgaagacg atcttctagc aatagccgca gaaaattgca taccggaaag 900

tgtcgtggca ccaatcactc atgatatatt catcaatgga tgtcaagtta acttcaagat 960

agatggaatt catgatgttg aaattggcac tctatatcct ggtgaatcgg taagaagttt 1020

ggaggaatgc tatgagaaat ttgttgtcat ggcggctgac aagattcata aagaagaaac 1080

tggagttacc gcaggtgggg gcggcacaac ggctatggta gagccggtgc caatcacagc 1140

ttcctgttga aaaggttcac ctgaggtgga tattcttttg agtcataaga catgttgatt 1200

gttgatgttg ttttcaagaa tgtttcatca tttcatgtgt tttattaatc ctaagtacaa 1260

ataattgctg tctacgtacg ttcttagttg caaaaattct tgttattctc tatcaaaaaa 1320

aaaaaaaaaa aaaaaaaaaa aaagtactct gcgttgttac cactgcttaa tcactagtga 1380

attc 1384

<210> 16
<211> 356
<212> PRT
<213> Trifolium repens

<400> 16

Met Ala Pro Ala Ala Thr Ser Ser Pro Thr Thr Pro Thr Thr Thr Lys
1 5 10 15

Gly Arg Val Leu Ile Val Gly Gly Thr Gly Phe Ile Gly Lys Phe Val
20 25 30

Thr Glu Ala Ser Leu Ser Thr Thr His Pro Thr Tyr Leu Leu Val Arg
35 40 45

Pro Gly Pro Leu Leu Ser Ser Lys Ala Ala Thr Ile Lys Ala Phe Gln
50 55 60

Glu Lys Gly Ala Ile Val Ile Tyr Gly Arg Val Asn Asn Lys Glu Phe
65 70 75 80

Met Glu Met Ile Leu Lys Lys Tyr Glu Ile Asn Val Val Ile Ser Ala
85 90 95

Ile Gly Gly Ser Asp Gly Leu Leu Glu Gln Leu Thr Leu Val Glu Ala
100 105 110

Met Lys Ser Ile Asn Thr Ile Lys Arg Phe Leu Pro Ser Glu Phe Gly
115 120 125

His Asp Val Asp Arg Ala Asp Pro Val Glu Pro Gly Leu Thr Met Tyr
130 135 140

Lys Gln Lys Arg Leu Val Arg Arg Val Ile Glu Glu Ser Gly Ile Pro
145 150 155 160

Tyr Thr Tyr Ile Cys Cys Asn Ser Ile Ala Ser Trp Pro Tyr Tyr Asp
165 170 175

Asn Cys His Pro Ser Gln Leu Pro Pro Pro Leu Asp Gln Leu His Ile
180 185 190

Tyr Gly His Gly Asp Val Lys Ala Tyr Phe Val Asp Gly Tyr Asp Ile
195 200 205

Gly Lys Phe Thr Met Lys Val Ile Asp Asp Glu Arg Thr Ile Asn Lys
210 215 220

Asn Val His Phe Arg Pro Ser Asn Asn Cys Tyr Ser Met Asn Glu Leu
225 230 235 240

Ala Ser Leu Trp Glu Asn Lys Ile Ala Arg Lys Ile Pro Arg Val Ile
245 250 255

Val Ser Glu Asp Asp Leu Leu Ala Ile Ala Ala Glu Asn Cys Ile Pro
260 265 270

Glu Ser Val Val Ala Pro Ile Thr His Asp Ile Phe Ile Asn Gly Cys
275 280 285

Gln Val Asn Phe Lys Ile Asp Gly Ile His Asp Val Glu Ile Gly Thr
290 295 300

Leu Tyr Pro Gly Glu Ser Val Arg Ser Leu Glu Glu Cys Tyr Glu Lys
305 310 315 320

Phe Val Val Met Ala Ala Asp Lys Ile His Lys Glu Glu Thr Gly Val
325 330 335

Thr Ala Gly Gly Gly Gly Thr Thr Ala Met Val Glu Pro Val Pro Ile
340 345 350

Thr Ala Ser Cys
355

<210> 17
<211> 18
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<213> Artificial

<220>
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<400> 17
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<210> 18
<211> 19
<212> DNA
<213> Artificial

<220>
<223> Primer sequence

<400> 18
tgcctgaaat tgagaaacc 19

<210> 19
<211> 18
<212> DNA
<213> Artificial

<220>
<223> Primer sequence

<400> 19
aaagctagcc ttgaagcc 18

<210> 20
<211> 19
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<220>
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<400> 20
tcggacataa ctcatgtgg 19

<210> 21
<211> 18
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<220>

<223> Primer sequence

<400> 21
ttgggttgga gaataagg 18

<210> 22
<211> 18
<212> DNA
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<220>
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<400> 22
tggacattta ttggttgc 18

<210> 23
<211> 18
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<220>
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<400> 23
tatcatgtct ggaaatgc 18

<210> 24
<211> 19
<212> DNA
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<220>
<223> Primer sequence

<400> 24
agattgcatc aaagaatgg 19

<210> 25
<211> 17
<212> DNA
<213> Artificial

<220>
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<400> 25
ggtccaaaag ccaatcc 17

<210> 26
<211> 18
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<220>
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<400> 26

taagacgaga catagtgg 18

<210> 27
<211> 18
<212> DNA
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<220>
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<400> 27
tattcactaa gcacatgc 18

<210> 28
<211> 19
<212> DNA
<213> Artificial

<220>
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<400> 28
tcatttctgc aataggagg 19

<210> 29
<211> 18
<212> DNA
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<220>
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<400> 29
atccacctca ggtgaacc 18

<210> 30
<211> 18
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<220>
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<400> 30
aataggaggc tctgatgg 18

<210> 31
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<212> DNA
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<220>
<223> Primer sequence

<400> 31
atccacctca ggtgaacc 18

<210> 32
<211> 17
<212> DNA
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<220>
<223> Primer sequence

<400> 32
aggctctgat ggcttgc 17

<210> 33
<211> 18
<212> DNA
<213> Artificial

<220>
<223> Primer sequence

<400> 33
atccacctca ggtgaacc 18

<210> 34
<211> 30
<212> DNA
<213> Artificial

<220>
<223> Primer sequence

<400> 34
gaattctaga agatatggtg agtgtagctg 30

<210> 35
<211> 30
<212> DNA
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<220>
<223> Primer sequence

<400> 35
gaattctaga atcacacatc ttatatagcc 30

<210> 36
<211> 55
<212> DNA
<213> Artificial

<220>
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<400> 36
ggggacaagt ttgtacaaaa aagcaggctt ctagaagata tggtgagtgt agctg 55

<210> 37
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<212> DNA

<213> Artificial

<220>
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<400> 37
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<210> 38
<211> 33
<212> DNA
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<220>
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<400> 38
gaattctaga agaagaaata tgggagacga agg 33

<210> 39
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<400> 39
gaattctaga aagacttcat gcacacaagt tcc 33

<210> 40
<211> 34
<212> DNA
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<220>
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<400> 40
gaattctaga tgattcattg tttgtttcca taac 34

<210> 41
<211> 31
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<220>
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<400> 41
gaattctaga acatattcat cttcctatca c 31

<210> 42
<211> 31
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<220>

<223> Primer sequence

<400> 42
gaattctaga tccaaattct cgtacctcac c 31

<210> 43
<211> 31
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<400> 43
gaattctaga tagttcacat ctctcggcag g 31

<210> 44
<211> 37
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<220>
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<400> 44
ggatcctcta gagcactagt gtgtataagt ttcttgg 37

<210> 45
<211> 35
<212> DNA
<213> Artificial

<220>
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<400> 45
ggatcctcta gacccccttа gtcttaaaat actcg 35

<210> 46
<211> 52
<212> DNA
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<220>
<223> Primer sequence

<400> 46
ggggacaagt ttgtacaaaa aagcaggctc tagaaagcaa agcaatggca cc 52

<210> 47
<211> 51
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<213> Artificial

<220>
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<400> 47

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<210> 48
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<220>
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<400> 48
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<210> 49
<211> 51
<212> DNA
<213> Artificial

<220>
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<400> 49
ggggaccact ttgtacaaga aagctgggtc tagatccacc tcaggtgaac c 51

<210> 50
<211> 52
<212> DNA
<213> Artificial

<220>
<223> Primer sequence

<400> 50
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<210> 51
<211> 51
<212> DNA
<213> Artificial

<220>
<223> Primer sequence

<400> 51
ggggaccact ttgtacaaga aagctgggtc tagatccacc tcaggtgaac c 51

<210> 52
<211> 36
<212> DNA
<213> Artificial

<220>
<223> Primer sequence

<400> 52
ccaccatgtt tgaaatttat tatgtgtttt tttccg 36

<210> 53
<211> 35
<212> DNA
<213> Artificial

<220>
<223> Primer sequence

<400> 53
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<210> 54
<211> 36
<212> DNA
<213> Artificial

<220>
<223> Primer sequence

<400> 54
ataataaccg gttgatcatg agcggagaat taaggg 36

<210> 55
<211> 36
<212> DNA
<213> Artificial

<220>
<223> Primer sequence

<400> 55
ataatagcgg ccgctagtaa catagatgac accgcg 36

<210> 56
<211> 32
<212> DNA
<213> Artificial

<220>
<223> Primer sequence

<400> 56
aatagcggcc gcgatttagt actggatttt gg 32

<210> 57
<211> 31
<212> DNA
<213> Artificial

<220>
<223> Primer sequence

<400> 57
aataaccggt acccacgaag gagcatcgtg g 31

<210> 58
<211> 32
<212> DNA

<213> Artificial

<220>
<223> Primer sequence

<400> 58
ataataaccg gtgcccgggg atctcctttg cc 32

<210> 59
<211> 36
<212> DNA
<213> Artificial

<220>
<223> Primer sequence

<400> 59
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<210> 60
<211> 34
<212> DNA
<213> Artificial

<220>
<223> Primer sequence

<400> 60
taataccggt aaatttatta tgrgtttttt tccg 34

<210> 61
<211> 37
<212> DNA
<213> Artificial

<220>
<223> Primer sequence

<400> 61
taatgcggcc gctaagggca gcccatacaa atgaagc 37

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